CMPSCI 105 Midterm Exam Solution
Spring 2007
March 30, 2007
Professor William T. Verts

GENERAL KNOWLEDGE

<1>   10 Points – Fill in your answer into the box at the left side of each question. Show your work on the back of a page if you want us to consider partial credit.

False	True or False: A 3½-inch diskette is a "hard disk".
False	True or False: A USB flash drive is a "hard disk".
False	True or False: The number π (3.1415926…) can be represented in a finite number of computer memory bits as its true value, not as an approximation.
True	True or False: The square root of 2 (1.414213562…) is an irrational number (not a ratio of two integers).
True	True or False: Two hexadecimal digits exactly fit into eight binary bits. (I.e., do both represent the same number of distinct numeric values?)
32	What is the decimal value of the digit **W** if we are using base 36 arithmetic? 0123456789ABCDEFGHIJKLMNOPQRSTUV**W**XYZ
83	Convert the binary (base 2) number 1010011_2 into decimal (base 10). $1{\times}2^6 + 0{\times}2^5 + 1{\times}2^4 + 0{\times}2^3 + 0{\times}2^2 + 1{\times}2^1 + 1{\times}2^0 = 64{+}0{+}16{+}0{+}0{+}2{+}1$
53	Convert the binary (base 2) number 1010011_2 into hexadecimal (base 16) using the bit-partitioning method. 0101 = 5, 0011 = 3
10110001	What is the sum in binary (base 2) of the two binary numbers 1010011_2 and 1011110_2?
1021	Convert the decimal (base 10) number 34_{10} into trinary (base 3). $1{\times}3^3 + 0{\times}3^2 + 2{\times}3^1 + 1{\times}3^0 = 1{\times}27 + 0{\times}9 + 2{\times}3 + 1{\times}1 = 27{+}0{+}6{+}1 = 34.$

<2>   6 Points – I want to create a background color for my Web page where the decimal value of the red component is 255, the decimal value of the green component is 20, and the decimal value of the blue component is 240. Approximately what color will be shown on screen? Fill in the blank below with the appropriate HTML hexadecimal color code:
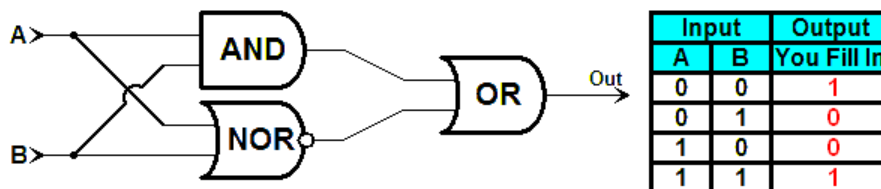
Red   = 255_{10} = **FF**$_{16}$
Green = 20_{10} = **14**$_{16}$
Blue   = 240_{10} = **F0**$_{16}$
High Red, Low Green, and High Blue = **Purple/Magenta/Fuchsia/etc.**

<BODY BGCOLOR="#FF14F0">

<3>   4 Points – Trace the following gate circuit and show its output for all combinations of input values.

Input		Output
A	B	You Fill In
0	0	1
0	1	0
1	0	0
1	1	1

UNIX & THE INTERNET

<4>   6 Points – Fill in the blanks below with the correct, complete HTML codes to finish the Web page as follows:

1.   The page title should be **My Spiffy Web Page**
2.   The page background should be a tiled image using the file **Froggy.gif**
3.   The **Welcome!** message must be centered on the screen <u>and</u> use an **H1** heading
4.   The hyperlink should be to the site **www.ibm.com**
5.   The clickable image should use the file **BigFrog.jpg**

```
<HTML>
      <HEAD>
            <TITLE>My Spiffy Web Page</TITLE>
      </HEAD>

      <BODY BACKGROUND="Froggy.gif">

            <CENTER><H1>Welcome!</H1></CENTER>

            <A HREF="http://www.ibm.com">

                  <IMG SRC="BigFrog.jpg">
            </A>
      </BODY>
</HTML>
```

<5>   6 Points – Assume for each of the following problems that the UNIX file **BigFrog.jpg** has permissions **rw------x** (i.e., the problems are independent of one another, and the result of one does not depend on any other answers). What are the permissions on the file after each of the following **chmod** commands are executed?

1.   **chmod 606 BigFrog.jpg**   **rw----rw-**

2.   **chmod a+r BigFrog.jpg**   **rw-r--r-x**

3.   **chmod 444 BigFrog.jpg**   **r--r--r--**

<6>   2 Points – Short Answer – What are the differences between Notepad and emacs?

Notepad is a Windows program, runs under graphical interface rules (mouse, menus, etc.). Emacs is a UNIX program, runs under keyboard commands only, and you must be telnet-connected to a UNIX computer to run it.

<7>   2 Points – Short Answer – Why do we now use a program such as PuTTY instead of traditional telnet programs?

PuTTY, etc., ***encrypt*** their communications so packet sniffers cannot read intercepted messages. Traditional telnets don't encrypt their communications.

<8>   3 Points – Once logged into an Internet site using UNIX ftp, what are the three commands that allow us to explore that remote site?

> **`dir`** (or **`ls`**)
> **`cd`**
> **`pwd`**

<9>   2 Points – In downloading a big file from the Internet I have a choice between two mirror sites in the same time zone that I am in.

1.   If I can wait a little while, when is the best time for me to do the download?

Late night, when traffic is likely to be low.

2.   If I cannot wait, which site should I pick (what factors influence my decision)?

Closest physical site with fewer hops (less likely to encounter traffic).

<10>   4 Points – I have a number of images that I want to put on the Web, but unfortunately they are all in the 24-bit-per-pixel **`.BMP`** format. In each case below, tell me if I should convert the image to **`.GIF`** format, to **`.JPG`** format, or if I should leave it as a **`.BMP`** file.

1.   The image is a photograph containing thousands of different colors.   **`.JPG`**

2.   The image is a photograph containing fewer than 200 colors.   **`.GIF/.JPG`**

3.   The image is line-art containing only two colors, black and white.   **`.GIF`**

4.   The image is a cartoon containing a couple dozen colors.   **`.GIF`**

If you are putting images on the Web then **`.BMP`** is never a valid choice.

<11>   5 Points – Short Answer – An image in a **`.BMP`** file is a combination of black and white line-art <u>and</u> a photograph containing thousands of colors. Why is it a bad idea to convert the image to *either* **`.GIF`** or **`.JPG`** format? What happens to the image in each case if I do? Is there a better, alternative format, which gets around the deficiencies of both the **`.GIF`** and **`.JPG`** formats and still lets me put the image on the Web?

`.GIF` loses colors because the format is limited to a maximum of 256 colors,
`.JPG` "fuzzes out" the line-art due to lossy compression,
`.PNG` supports millions of colors and has lossless compression.

MICROSOFT WINDOWS & ACCESSORIES

<12> 2 Points – In any Windows program, what does it mean when a menu entry is gray?

The menu entry is *inactive* and cannot be used (or it doesn't make sense to use the menu entry in the current context).

<13> 2 Points – If I left-click-drag a file from the Windows desktop to my flash drive, will the file be moved or copied?

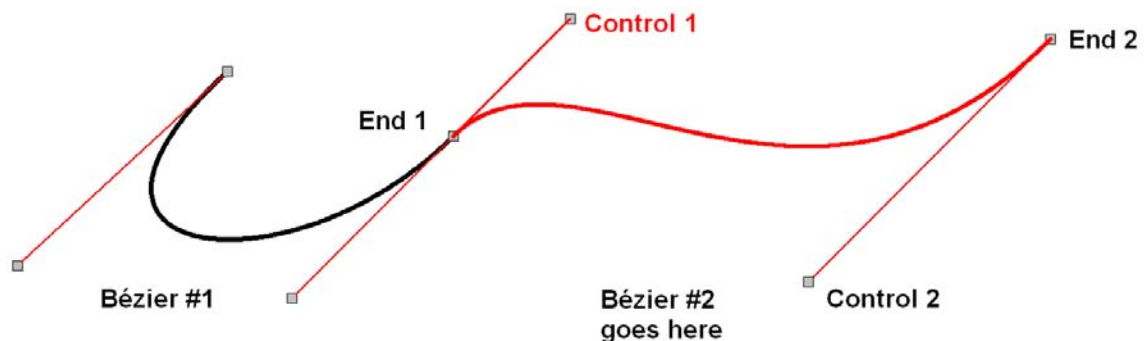*Copied* – The desktop is on drive `C:` and the flash drive is a different drive letter.

<14> 2 Points – Short Answer – Why should I use `.ZIP` archives to distribute files on the Web?

The contents of a `.ZIP` file are *compressed*, and `.ZIP` files *allow multiple files* to be stored inside (so one download gets everything and goes faster than with multiple uncompressed files).

<15> 2 Points – I've downloaded an `.EXE` program from the Web. What should I do before running it?

Scan it for viruses.

<16> 5 Points – The following diagram shows Bézier curve #1 as I might draw it in Windows Paint, along with its endpoints and control points. Draw Bézier curve #2 so that it blends smoothly into Bézier curve #1. The endpoints and one of the control points for Bézier #2 are given to you; as part of your answer you will need to indicate on your drawing where to place Control 1 (any legal placement for Control 1 is OK).

Control 1 must be in-line with End 1 and the corresponding control point from Bézier #1, and the new curve leaves End 1 tangent to the control line.

WORD PROCESSING

<17>   3 Points – In the text sample shown here:

ONE WAY – EXIT ONLY

1.   Point out all places where ***kerning*** can be used to reduce unnatural-looking white space.

   Kerning happens between the WA, AY, and LY pairs only.

2.   Point out examples of ***serifs***.

   Any of the little spikes on the tips and ends of the letters.

3.   Each word is ½ inch from the ascender line to the descender line. What is the ***point size*** of that text?

   ½ inch × 72 points/inch = **36 points**.

<18>   5 Points – Short Answer – I have designed a new named ***style*** in Microsoft Word to have several desired attributes, including specific typeface, line spacing, indentation, and other settings, and I apply that style to all the paragraphs in my document. What happens to my document when I <u>change</u> the definition(s) in that style?

   All paragraphs are updates automatically to reflect the new style definitions.

<19>   5 Points – Short Answer – Why might I save a document as `.PDF` (Adobe Acrobat) format?

   1.   To distribute documents in a form that anyone can read/view in the way it should appear on the printer (regardless of the word processor used to create it, and Acrobat Reader is free).

   2.   To protect intellectual property by password protecting the document – you can allow reading/printing but can forbid text extraction/modification.

SPREADSHEETS

<20>   10 Points – Here is a spreadsheet containing exam records for students in a small class.

	A	B	C	D	E
1					
2					
3		Student ▼	Exam 1 ▼	Exam 2 ▼	
4		Fred	68	72	
5		Sam	23		
6		Mary		43	
7		Carol	82	90	
8		Joe	90	85	
9		Sue	68	71	
10		Martha	14		
11		Bob	57	64	
12					
13		Count	7	6	
14		Average	--	--	
15		Maximum	90	90	
16		Minimum	14	43	
17					
18					

1.   (1 point) Write below a single, <u>efficient</u> formula designed to go into cell **C13** which computes the <u>count of students</u> who took Exam 1. Structure your formula so that it can be copied into cell **D13** to give the appropriate value for Exam 2.

<p align="center">**=COUNT(C4:C11)**</p>

2.   (1 point) Write below a single, <u>efficient</u> formula designed to go into cell **C14** which computes the <u>average score</u> for Exam 1. Structure your formula so that it can be copied into cell **D14** to give the appropriate value for Exam 2.

<p align="center">**=AVERAGE(C4:C11)**   *or*   **=SUM(C4:C11)/COUNT(C4:C11)**</p>

3.   (1 point) Write below a single, <u>efficient</u> formula designed to go into cell **C15** which shows the <u>highest score</u> for Exam 1. Structure your formula so that it can be copied into cell **D15** to give the appropriate value for Exam 2.

<p align="center">**=MAX(C4:C11)**</p>

4.   (1 point) Write below a single, <u>efficient</u> formula designed to go into cell **C16** which shows the <u>lowest score</u> for Exam 1. Structure your formula so that it can be copied into cell **D16** to give the appropriate value for Exam 2.

<p align="center">**=MIN(C4:C11)**</p>

5.   (3 points) On the spreadsheet above, write into cells **C13**, **C15**, **C16**, **D13**, **D15**, and **D16** the expected computed answers for the corresponding formulae (you are <u>*not*</u> required to compute the averages for the cells in row **14**).

6. (3 points) I next click on the AutoFilter button on column **C** (Exam 1) and select 68 from the drop-down list. What are the names of the students who will still be shown afterwards?

<p style="color:red;text-align:center;">Fred and Sue</p>

<21> 5 Points – Here is the same table as before, this time with the AutoFilter removed and the data selected for sorting.

	A	B	C	D	E	F	G	H	I
1									
2									
3		Student	Exam 1	Exam 2					
4		Fred	68	72					
5		Sam	23						
6		Mary		43					
7		Carol	82	90					
8		Joe	90	85					
9		Sue	68	71					
10		Martha	14						
11		Bob	57	64					
12									
13		Count							
14		Average							
15		Maximum							
16		Minimum							
17									
18									

Sort dialog:
Sort by: Exam 1 — Ascending / Descending (selected)
Then by: Exam 2 — Ascending / Descending (selected)
Then by: — Ascending (selected) / Descending
My data range has: Header row (selected) / No header row
Options... OK Cancel

Show the result of the sort in the following image (write your answers in cells **B4:D11**).

	A	B	C	D	E
1					
2					
3		Student	Exam 1	Exam 2	
4		Joe	90	85	
5		Carol	82	90	
6		Fred	68	72	
7		Sue	68	71	
8		Bob	57	64	
9		Sam	23		
10		Martha	14		
11		Mary		43	
12					
13		Count			
14		Average			
15		Maximum			
16		Minimum			
17					
18					

<22> 4 Points – The formula **=NOW()** returns the internal date number 39171 for March 30, 2007. For the formula **=NOW()+16** what is the internal date number that is computed and what is the calendar date shown on screen?

<p style="color:red;text-align:center;">39187 = April 15, 2007</p>

<23> 5 Points – Cell **AB9** contains the following formula which is then copied to cell **X15**. What is the resulting formula in cell **X15** after the copy has been completed?

<div align="center">

`=Z12+(14*$W$20)-AC8+$M14`

`=V18+(14*$W$20)-Y14+$M20`

</div>